

Operating Instructions

**Z3 Z5 Z10
(Z20 Z50)**

tensile tester

		
Z3 Z5	Z10	Z20 Z50

23.3.2011



Z3 3kN –Z5 5kN tensile tester



Z10 tensile tester 10 kN

OPERATING INSTRUCTIONS

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7.03

SECTION 1: INTRODUCTION

1.01 This manual is to help the operator understand the operation of the electronic panel of the machines.

These new testing machines are an easy-to-use range of compact machines for determining Tension, Compression Shear, Flexure and other mechanical and physical properties of materials. Due to variations in international standards of units in force and extension, the tensile test machines have the ability for the operator to select a one of two standards for Force Units (Newtons and Pounds) and either Inches or Millimeters for the Extension Units.

1.02 All the controls are located on the front panel, which has large, easy-to-read backlit 2-line LCD display and a numeric keypad. The display unit shows the force and displacement values. Crosshead control keys are provided for moving crosshead up or down, or to start a test, or to get access to various test parameters, for example, displacement or speed of crosshead. The numeric keypad permits the inputting of test data.

1.03 There may be many aspects of material testing not covered in this operation manual in particular the type of grips used and additional optional equipment (for more information see our page in Internet:

1.04 All machines are provided for voltages 230 VAC or 115 VAC.

SECTION 2:GENERAL SPECIFICATIONS

These specifications apply to all models of the Tensile Test machines.

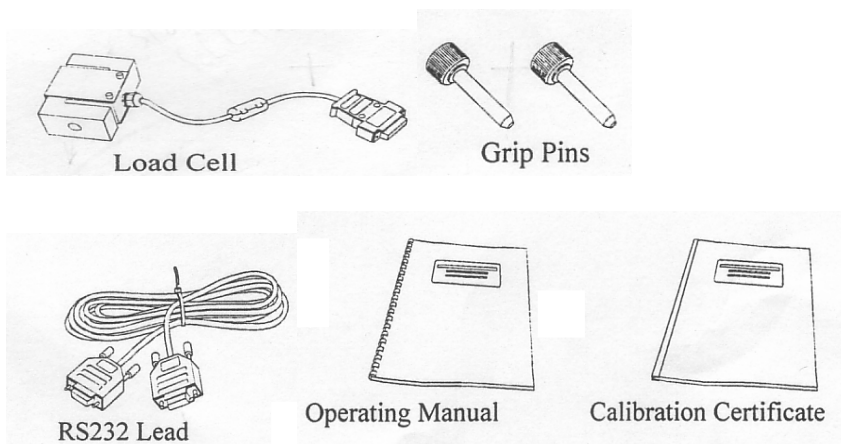
- 2.01 Force Measuring System - Full bridge strain gauge load cell of Z-Beam construction for use in tension or compression. These interchangeable load cells are available from the maximum capacity of the load frame, down to 5N.
- 2.02 Force Measuring Resolution - ± 17 bit (=18 bit) of load cell capacity over the full range (nominal).
- 2.03 Force Accuracy - $\pm 0,5\%$ of the indicated load from 2 to 100% of load cell capacity and 1% down to 1% of the load cell capacity.
- 2.04: Force Sampling Rate - 50 Hz nominal (optional up to 800 Hz).
- 2.05 Extension Resolution - 0.001 mm (0.0001in.) of the full crosshead travel.
- 2.06 Operating Environment – All machines are designed to operate in temperatures of 0 to 38°C (32 to 100°F) with a non-condensing atmosphere of 10 to 90% Relative Humidity.

SECTION 3: CHECKING CONTENTS

The machines are shipped completely assembled except for the optional accessories. The basic machines are supplied with the following items, please insure that these are included for the installation:

- Z-Beam Load Cell at or below the maximum capacity of the load frame;
- two Grip Pins (8 mm) for an adapter;
- operating instruction manual;
- load cell calibration certificate;
- one USB Serial Port Lead for external computer control;
- one 220 V cable.

The following diagrams are to help to identify each item:



Number Of Machine:

On the backside of each machine you find the number (Typ Nr.). Please use it for future reference.

Thümler GmbH

Hans-Traut-Str.25
90455 Nürnberg
Tel.: 09122-78711

Typ Nr.: TH3630 10-320-2003
Spannung: 230 (110) V 50Hz
Strom: 1 (2) A

Made in Germany



SECTION 4: POWER ON CHECKS

4.01 Power On/Off Switch The On (1) and Off (0) power switch is located on the back side of the machine and should be in the Off (0) position before applying power to the machine. The picture below indicates location of the power switch:



4.02 Emergency Stop Push Button The Emergency Stop push-button is located on the front panel of the machine.

To activate the emergency stop you have to push the button. To deactivate the emergency stop turn the button to the left and the button jumps out.

The picture below indicates location of the emergency stop push-button:



4.03 Mechanical Limit Switches Before attempting to move the crosshead in either direction it will be required to set the mechanical crosshead limit switches. The purpose of the limit switches is to reduce the travel of the crosshead enabling a safe working area. A typical

example is to protect the load cell and attachments for unforeseen overtravel and in doing so avoid a collision. These limit switches are located on the left hand side of the machine. The diagram below shows the location of the mechanical crosshead limit switches:



The limit switches are held in position by a locking screw. To set the limit switch unlock by turning the locking screw in an anti-clockwise direction and slide to the required new position. To lock limit switch rotate locking screw in a clockwise direction. (Note: To eliminate slippage re-tighten locking screw securely).

The diagrams below indicate mechanical crosshead limit switches:

Release Upper Limit Switch, move crosshead to a new position, slide limit switch to crosshead striker, re-tighten.

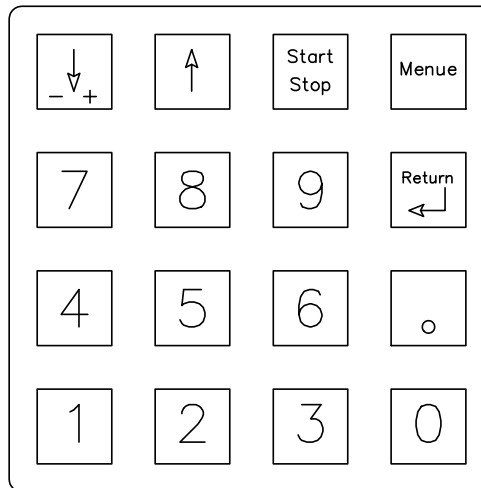
Release Lower Limit Switch, move crosshead to a new position, slide limit switch to crosshead striker, re-tighten.

SECTION 5 : CONTROL DISPLAY UNIT

5.01 Control Display Panel This unit contains the LCD Display, the Numeric Keypad and the Emergency Stop push-button.



5.02 Numeric Keypad These keys are normally used for entering numeric values on the LCD-Display (Speeds, Extension, etc.).



Crosshead Control Keys There are two crosshead directional arrows:



The down arrow is used for lowering the crosshead and for inputting negative values.



The Up arrow is used for raising the crosshead.



This key starts and stops a running test. If the [Start – Stop] key is pressed during a test, the procedure is interrupted. The same happens if you press any other key.



The Menu Key
With this key the operator can make settings for the next test. The adjusted settings should be confirmed with the Return key.



By pressing the [Return] key the operator stops or returns the crosshead to zero extension after the test.



This key will zero the Force and Extension display.

1

This key shows the maximum Force and the referring Extension of the last test.

2

This key shows the Force and the Extension of the Rupture.

This key has no function.

This key has no function.

5

This key is used to enter the configuration menu. This menu is protected with the password (09122).

This key has no function.

This key has no function.

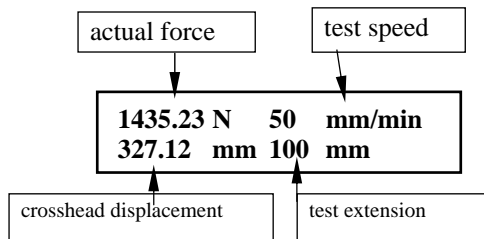
8

This key allows switching to constant force mode.

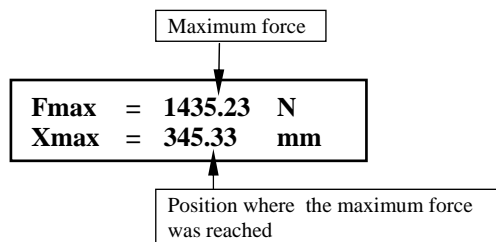
This key has no function.

5.03 LCD DISPLAY

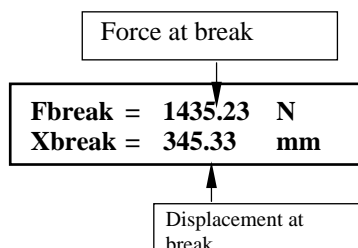
When you switch on the machine you get a message about the Firmware, then you see the following:



When the test is finished (i.e. when the extension is reached, or the maximum force is exceeded, or the break of the specimen is detected) you see the maximum force of the last test.



By pressing the [2] key the operator gets information about the force at break.



5.04 MENU

M

The [Menu] Key

With this key the operator can make settings for the next test. The adjusted settings should be confirmed with the [Return] key.

If you press the [Menu] key, you will see the following:

ENDPOS - means "Test Extension".

The range is possible from 1 mm to 540 mm (for the smallest version of the machine), except for the length of grips and specimen. Positive values mean tensile test; negative values mean compression test. In order to change from – to + you have to press the [Down] key.

V - means "Test Speed".

The range is from 0,5 mm/Min to 500 mm/Min (only positive values are possible).

F-LIMITS - means "Force Limit".

The Force Limit can be used to protect tooling rated lower than the load cell capacity, to end a test when that force is reached.

F-DELTA - means Force Delta.

Force Delta is the sensitivity for detecting the rupture of a specimen, i.e. the value of 200N means, if during a tensile mode the load decreases more than 200N/50ms, the rupture is detected and the test is finished.

i value is too low rupture is not detected by the machine and runs till end of setted movement

F-MAN - means Jog Speed.

The range is possible from 1 mm/Min to 500 mm/Min.

SECTION 6: CONFIGURATION

By pressing the [M] key during the switching on the machine until the “Password” is shown on the Display, or by pressing the [5] key the operator enters the configuration menu. To prevent an accidental change of configuration data this menu is protected with the password.

The procedure is as follows:

By pressing the [5] key the display shows “Password?”; the operator should press “09122” and after that the settings of the machine can be changed.

6.01 Language Selection:

LANGUAGE:	1
German =1	↑↓

With these keys the operator can choose the desired language and with the [Return] key confirm the choice.

The operator can also select the desired language:

- 1** =German
- 2** =English
- 3** =Italian
- 4** =French
- 5** =Spanish
- 6** =Danish

(add a new language
<http://www.youtube.com/watch?v=LDNiORc5TlQ&feature=youtu.be>)

6.02 The Selection Of The Used Units:

Selected :1 (SI)

Units: 1 [1-SI,2-Eng]
new: _____

Here 1 for N and .mm
or 2 for lbf and.inch

If you use the system “Millimeters/Newtons (mm/N), you have to press [1]; if you use the system “Inches/Pounds (in/lbf), press [2].

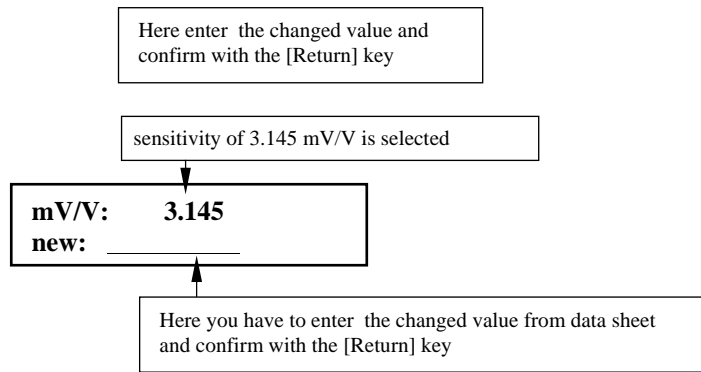
By pressing the [Return] key you go to the next Menu-Entry.

6.03 Load Cell Capacity:

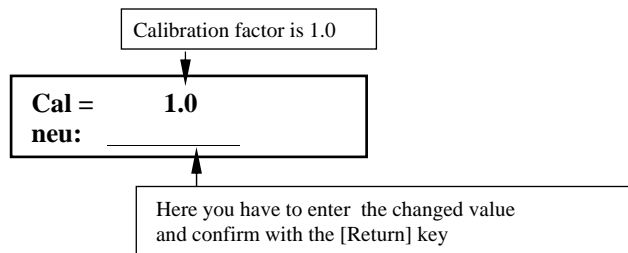
Loadcell 2000 N is

Loadcell: 2000 N
new: _____

6.04 Load Cell Sensitivity:

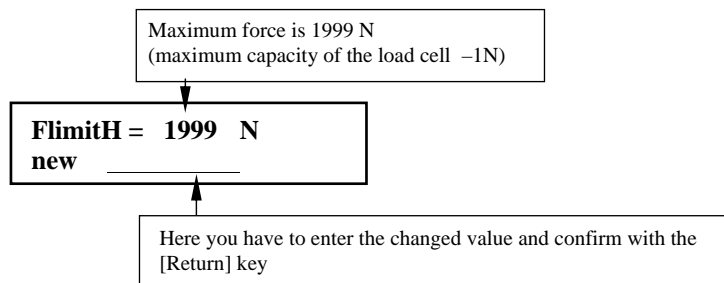


6.05 Calibration Factor:



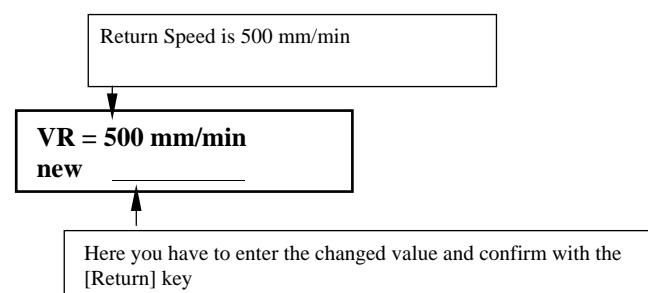
If you enter [0]", you start a calibration program (see: "Change of the load cell").

6.06 Maximum Force of the Machine:

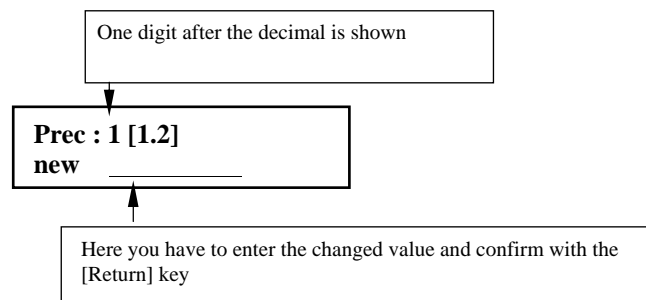


When the amount of the force is exceeded, the machine is automatically switched off and an emergency message is shown.

6.07 Return Speed: Return Speed is the speed for the Return key ("Return home function").



6.08 Digits After The Decimal Point:



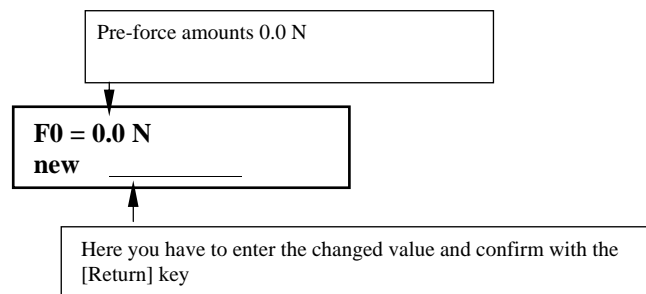
“Prec” means “precision.

6.09 Type Of The Machine:

The “Machine type” can be set from 1 to 6 with the following meaning:

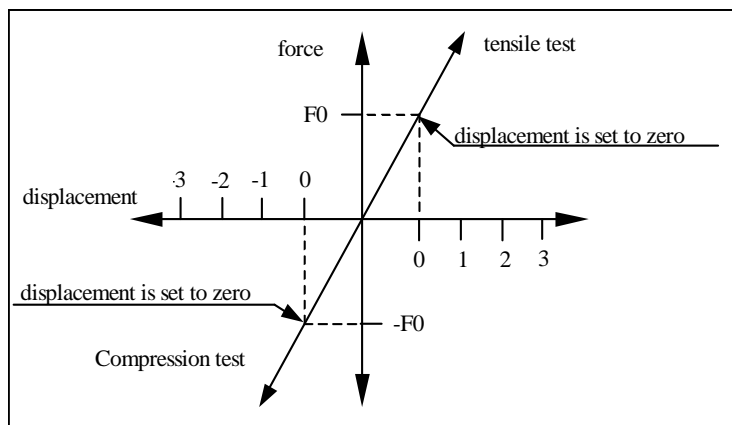
- 1 for TH 2730 3 kN (40 W, 500mm);
- 2 for TH 2730 3 kN (40 W, up to 1200 mm (a long version));
- 3 for TH 2730 5kN (80 W, 500 mm);
- 4 for TH 2730 5 kN (80 W, up to 1200 mm (a long version));
- 5 for TH 3630 10 kN (2x80 W, 500 mm);
- 6 for TH 3630-1000 10 kN(2x80, up to 1200 mm (a long version)).

6.10 Pre-force setting:



If the actual force exceeds the pre-force during the tensile test, or drops below the pre-force during the compression test, the extension measurement begins with 0.00 mm. This function is ineffective when the pre-force amounts 0 N. All settings are power-failure safe stored.

PreForce Function



SECTION 7: LOAD CELL

7.01 Fitting Load Cell:

The Z-Beam type load cell are mounted under the moving crosshead. Your machine will be provided with a load cell equal to or less than the maximum capacity of the machine. These interchangeable Load Cells are available in capacities from 3 kN down to 5 N. Connect the load cell by plugging the 5 pin connector into the load cell socket on the rear side of the machine.

7.02 Limits of the Load Cell:

Load Cell should not be deformed more than maximum 0,2 mm in both directions. By doing pressure tests be sure that you do not bend a load cell to the side. Using a low force load cell there is a high risk of its damage by permanent bending of the load cell which is due to its constructive principle. If there is danger of the load cell overload we recommend to use special protection equipment which we also provide. After overload the load cell still shows measurements but they are not linear anymore. That is why we recommend to use pneumatic grips for low force tests to avoid an accidental destruction of the load cell when tightening the clamps. To ensure the accuracy of the load cell a calibration test should be done with different weights. If it is necessary adjust also the calibration factor. We can only provide the load cell function as guaranteed by the manufacture. Any claims which are due to false fixing or overload are not accepted.

7.03 Zero Adjustment:

By pressing the [1] key before testing zero adjustment is done. As already the clamping of specimen produces force zero adjustment should be always done before each test.

7.04 Change of the Load Cell:

In order to change the load cell you have to do the following:

1. switch off the machine;
2. loosen the fixing screw at the crosshead;
3. mount a new load cell with the fixing screw at the crosshead;
4. put a load cell plug into the connector on the back side of the machine;
5. switch on the machine.

Each load cell has its own capacity, sensitivity and a calibration factor. That is why each time after the change you have to enter new values.

It is done as follows:

1. press the [5] key;
2. enter the password "09122";
3. save old parameters on a piece of paper and enter new values (from data-sheep):
 - load cell capacity, e.g. 3 kN;
 - load cell sensitivity, e.g. 3.1324mV/V;
 - set calibration factor to "1".

With these values you will reach approx. 1% accuracy of the load cell capacity.

7.05 Calibration With The Weight:

In order to increase the accuracy of the machine you have to calibrate with the weight.

It is done as follows:

- remove load from the load cell (if there is any);
- set calibration factor to "0.

The display shows the following:

(Do not be confused that the display shows the messages in German, - this program is used seldom, that is why we did not translate into English. On the right side of the page you see the messages translated into English).

mit Gewicht eichen weight calibr. 1=ok

Calibrate with weight Weight calibr. 1=ok
--

Confirm with the [1] key, then you see the following:

Lastzelle entlasten weiter mit Taste

Remove load from the load cell

When the machine does not vibrate, press any key.

Last aufbringen weiter mit Taste

Burden the load

Now hang a known weight on the load cell, wait till it is motionless and then press any key.

Faktor bestimmen weiter mit Taste

The machine calculates the factor

Press any key.

Faktor bestimmen 15%

The machine calculates the factor 15%
--

The machine calculates now the factor automatically, it counts from 1 till 100%.
When the procedure is completed, the machine awaits that the operator enters the force that the load cell was loaded with.

Last: 38.460 N Neu:

The pre-set force is 38.460 N Enter the loaded force

Now you have to enter the force that the load cell was loaded with.

38.46 N
Last ok=1 again=9

The actual force is 38.46 N
Force ok =1 again=9

Because of the vibrations of the machine the last digit of the force reading is not stable. The average value should be the same as the weight. When you are satisfied with the calibration, press the [1] key and you will end the routine. If you press the [9] key, you start the procedure once again.

The display shows the calculated calibration factor.

Faktor ist gesetzt:
1.003

The factor is set:
1.003



Video

<http://www.youtube.com/watch?v=pyShrv-ilYw&feature=youtu.be>

SECTION 8 INTERFACE USB

1.0 *Table of orders for TH 2730*

(for software up to ver.4.35)

ORDER	FUNCTION	EXAMPLE	RESULT
	End of commands is always \$ * Decimal separator is '.'		
'A'	Actual readings	A\$	Force ;Way
'B'	Last readings (rupt. value)	B\$	Frupt Xrupt
'C'	Write configuration data block	C\$	Receive Conf. Data
'Dxxx'	Set F delta	D20\$	F delta=20N
'E'	Return to zero position	E\$	Return button (to 0,00mm)
'Fxxx'	Set limit of force in test (F limitS)	F200\$	F limitS=200N
'G'	Read configuration data block	G\$	Send Config. data to comp.
'H'	Stop machine	H\$	Stop button
'H?'	Ask for listing command set	H?\$	Command set listing
'Jxxx'	Set return speed	J200\$	VR=200 mm/min
'K0'	Set normal mode	K0\$	Machine in Normal mode
'K1'	Set Constant Force Regulation mode	K1\$	Machine in CFR mode
'Lxxx'	Set end position for test	L100\$	X=100mm
'M'	Last readings (max. value)	M\$	Fmax Xmax
'N'	Read nominal load	N\$	2000 (Load cell = 2000N)
'O'	Reset Load cell and position counter	O\$	0,0N 0,00mm ("0" button)
'O1'	Reset position counter only	O1\$	2,0N 0,00mm
'O2'	Reset Load cell only	O2\$	0,0N 7,34mm
'Pxxx'	Set preforce (F0)	P0.4\$ *	F0=0.4N
'Qxxx'	Set constant force to keep (in CFM)	Q200\$	Force to keep = 200N
'QTxxx'	Set time to keep (in CFM)	QT60\$	Time to keep = 60sec
'QHxxx'	Set stiffness factor of sample (1..10)	QH1\$	1 – slow regulation "hard"
'R'	Begin the Test	R\$	Start button
'RHxx yy'	Begin the Hysteresis Test with: xx –delay time, yy –cycles (repeating)	RH10 2\$	2 cycle with 10 sec waiting time
'RESET'	Hard reset	RESET\$	Reset of system
'S'	Ask for Status	S\$	Condition of machine
'SER?'	Ask for serial number of machine	SER?\$	0001 (max 20char.)
'SER:'	Set serial number in machine	SER:0001\$	Set ser.# 0001 (max 20char.)
'T'	Read software ver. nr. in Flash mem.	T\$	" HEX-4.35 7. 2005 "
'U'	Ask for actual units (US or SI)	U\$	1-SI system, 0-Us system
'Vxxx'	Set speed testing speed	V100\$	V=100mm/min
'Xxxx'	Move to position with "Return	X20\$	Drive to position of 20mm

	speed" (Jxx)		
--	--------------	--	--

1.01.1 Serial communication port :

Pin 1=DCD

Pin2=Rx D

Pin3=Tx D

Pin4=DTR

Pin5=GND

Pin6=DSR

Pin7=RTS

Pin8=CTS

Pin9=RI

Data format :

Baud rate 38400

Data 8

Parity None

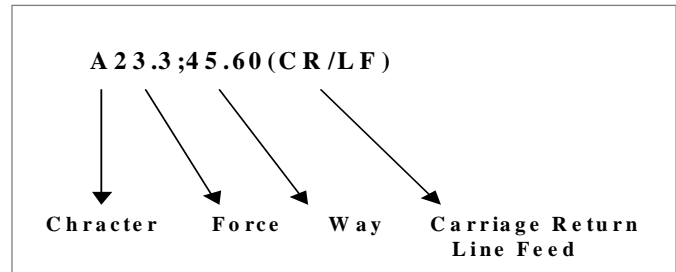
Stop bits 1

Protocol none

1.01.2 Transferexample:

Character possibility:

„A“ -actual readings
 „M“ -last readings of max. value(Fmax ; Xmax)
 „B“ -last readings of break(Fbreak ; Xbreak)
 „S“ -status of machine
 „E“ -machine return to zero position
 „R“ -test is running
 „OK“ -reset of Load cell and position is done
 EOF (ASCII=26)-end of data, end of test



Force = 23.3N
 Way = 45.60mm

1.02 C 251 Compiler Communication procedure.

```

...
switch(combuffer[0])
{
  case 'R':versuch(0);
    break;
  case 'E':moveto(wegoffset,Tconfig.VR);
    printf("E\n\r");
    break;
  case 'H':mstop();
    break;
  case 'O':adnullen();
    printf("OK\n\r");
    break;
  case 'A':printf("A% 6.*F;% 6.2F\n\r",Tconfig.nachkomma,getkraft(),getweg());
    break;
  case 'M':printf("M% 6.*F;% 6.2F\n\r",Tconfig.nachkomma,fmax,xmax);
    break;
  case 'B':printf("B% 6.*F;% 6.2F\n\r",Tconfig.nachkomma,frupt,xrupt);
    break;
  case '$':resetproc();
    break;
  case 'V':combuffer[0]=' ';
    T=atof(combuffer);
    if ((T>1)&&(T<1000)) Tparablock.SPEED=T;
    break;
  case 'L':combuffer[0]=' ';
    T=atof(combuffer);

```

```

        Tparablock.endpos=T;
        break;
    case 'X':combuffer[0]=' ';
        T=atof(combuffer);
        moveto(T,Tconfig.VR);
        break;

    case 'S':printf("S%d\n\r",status);

```

1.03 Delphi 3.0 Receive procedure (for exp.)

```

procedure TForm1.receive(s:string);
const status:word=0;
var  s1,s2:string;
     index1,index2:word;
     y:tvaluesx;
begin
    case s[1] of
        'A':  Begin
                index1:=pos(';',s);
                s1:=copy(s,2,index1-2);
                index2:=pos('#10,s);
                s2:=copy(s,index1+1,index2-index1-1);
                panel2.caption:=s2+'mm';
                panel3.caption:=s1+' N';
            end;
        'R':  Begin
                if status=0 then
                    begin
                                                                xychart1.clear;
                                                                timer1.enabled:=false;
                                                                inc(status);

                                                                end;
                index1:=pos(';',s);
                s1:=copy(s,2,index1-2);
                index2:=pos('#10,s);
                s2:=copy(s,index1+1,index2-index1-1);
                panel2.caption:=s2+'mm';
                panel3.caption:=s1+' N';
                Y[0]:=strtofloat(s2);
                Y[1]:=strtofloat(s1);
                Y[2]:=0;
                Y[3]:=0;
                y[4]:=0;
                xychart1.add(y);
            end;
    #26: begin
            status:=0;
            timer1.enabled:=true;

```



```

        speichern1click(self);
    end;
end;
end;

```

4) *Change of configuration*

by pressing "Menu" during power on or "5" key you call the config menu.

to prevent accidental change of configuration it is necessary to key in the Code.

proceed as follows:

*after pressing "5" key the display shows: "Paßwort ? "
now key in the number "09122" if you entered the code correctly
you can either load the pre-set values or change them.*

*display shows: Grundeinstellung ?
Ja=0*

*by pressing "0" the machine load the following values:
by pressing "Return" you skip the defaults.*

defaults values:

language (Sprache) 1=deutsch 2= english 3= italiano 4=francise

UNITS ½ mm N / in lbf (1lbf = 4.44822 N / 1 in = 25.4 mm)

<i>LOADCELL</i>	<i>[N]</i>	<i>2000</i>
<i>load cell Sensitivity (Lastzellenempfindlichkeit)</i>	<i>[mV/V]</i>	<i>3.165 (example)</i>
<i>Calibration factor (Kalibrierfaktor)</i>	<i>[FAK]</i>	<i>1.000</i>
<i>by pressing "0" you start a Calibration program</i>		
<i>F limit H (maximum force for Hardware)</i>	<i>[N]</i>	<i>1500 [N]</i>
<i>repositioning speed (Rücklaufgeschwindigkeit)</i>	<i>[VR]</i>	<i>500mm/min</i>

F(0) [N] (preload) .

these settings are stored in a non volatile ROM and are re-established after every power on.

We recommend to note all changes on a piece of paper.

Machine type

'Machine type' can be set to 1..6 value with following meaning:

*'1' for small engine (40W), short machine (up to 500mm) TH 2730 3kN
'2' for small engine (40W), long machine (up to 1200 mm) TH 2730 3kN 1000mm Verfahrweg
'3' for big engine (80W), short machine (up to 500mm) TH 2730 5kN
'4' for big engine (80W), long machine (up to 1200 mm) TH 2730 5kN <1000mm Verfahrweg
'5' for two big engines (80W -10kN), short machine (up to 500mm) TH 3630 10 kN
'6' for two big engines (80W -10kN), long machine (up to 1200 mm). TH 3630 10 kN <1000 mm*

*After update parameter is '0' and **must be set to value between 1 and 6** ('0' and '7' is not allowed).*

In machine without program (empty) this parameter is automatic set to '1'.

For more information see info-hex-3-65.txt file.

5) *Load Cell*

5.1) Limits of the Load Cell

The Load Cell mustn't be deformed more than max. 0.2 mm in pulling direction!

*Doing pressure tests ensure that the Load Cell does not bend out to the side!
Specially using low force Load Cells there is a high risk of damage by permanent bending of the Load Cell which is due to the Load Cells construction principle
In case there is a danger of Load Cell overload we recommend to use special protection equipment which we also provide. (www.grip-engineering.com)*

After overload damage the Load Cell may still show measurements, but is not linear anymore.

This is why we recommend the use of pneumatic grips for low force tests to avoid accidentally destruction of load cells when tightening the clamps.

To ensure the accuracy of a Load Cell a calibration test should be done with multiple different weights. If necessary adjust the calibration factor .

We only can provide the Load Cell Function as guaranteed by the manufacturer Interface/Huppert. Any warranty claims which are due to mal -operation or overload will not be accepted.

5.2) Zero adjustment

*By pressing " 0 " before testing a **Zero adjustment** is done.*

*As already the clamping of probes does produce forces a **Zero adjustment** should always be done before testing.*

5.3) change of load cells

Switch off power on the machine

- *loosen the screw at the cross bar*
- *mount new load cell with the screw at the cross bar*
- *put load cell plug into the connector at the back side of the machine*
- *Switch on the machine again and wait to end of self test procedure*
- *press "5"*
- *type Password: "09122"*
- *save old parameters on a piece of paper and type the new values*

- *set new parameter for 'Loadcell' e.g.: 2000 [N]*
- *set new parameter for 'mV/V'*
(load cell sensitivity) e.g.: 3.165 [mV/N]
- *set new parameter for 'Cal' (calibration factor) to "1"*

set calibration factor with weight

*put a calibration weight at the load cell, e.g. : 10 kg = 98.0665 N (***

the display should show a similar value

E.g. the display shows 95.6 N the calibration factor must be increased:

from 1 to 1.03745 (use calculator)

check the changes with the weight again!

*** (this is dependent to your location and valid for 45° northern / e.g. at the*

North pole it would be 98.32 N / at the Equator 97.80 N)

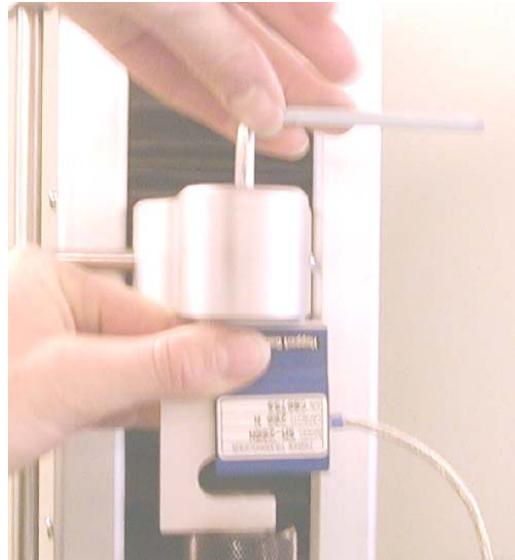
Mounting procedure of Load Cell

Caution!

Small type of load cells can easily be deformed especially by torsion forces.

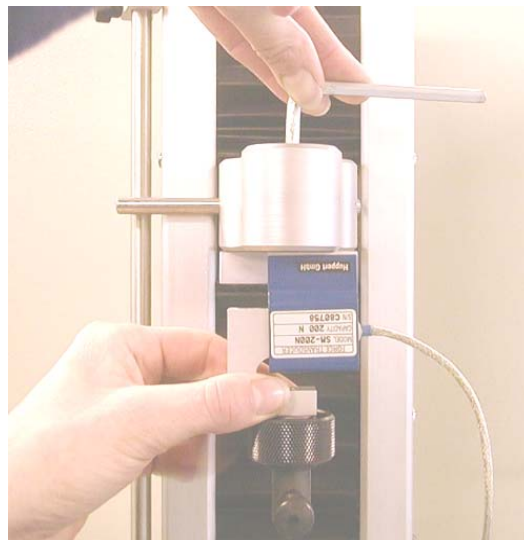
Never put torsion forces on the Load cell while tightening or loosen probes and clamps

*only hold the load cell at the upper part!-----
right ↓*



✓ OK.

*wrong ↓
do not mount like this! Load cell is likely to be destroyed .*



✗ never

*Load cell have a fragile area with tiny parts and adjusted DMS strips inside.
These thin Stege can easily be deformed permanently by torsion forces.*

6) Interface USB

Table of orders for TH 2730

ORDER	FUNCTION	EXAMPLE	RESULT
	End of commands is always \$ * Decimal separator is '.'		
'A'	Actual readings	A\$	Force ;Way
'B'	Last readings (rupt. value)	B\$	Frupt Xrupt
'C'	Write configuration data block	C\$	Receive Conf. Data
'Dxxx'	Set F delta	D20\$	F delta=20N
'E'	Return to zero position	E\$	Return button (to 0,00mm)
'Fxxx'	Set limit of force in test (F limitS)	F200\$	F limitS=200N
'G'	Read configuration data block	G\$	Send Config. data to comp.
'H'	Stop machine	H\$	Stop button
'H?'	Ask for listing command set	H?\$	Command set listing
'Jxxx'	Set return speed	J200\$	VR=200 mm/min
'K0'	Set normal mode	K0\$	Machine in Normal mode
'K1'	Set Constant Force Regulation mode	K1\$	Machine in CFR mode
'Lxxx'	Set end position for test	L100\$	X=100mm
'M'	Last readings (max. value)	M\$	Fmax Xmax
'N'	Read nominal load	N\$	2000 (Load cell = 2000N)
'O'	Reset Load cell and position counter	O\$	0,0N 0,00mm ("0" button)
'O1'	Reset position counter only	O1\$	2,0N 0,00mm
'O2'	Reset Load cell only	O2\$	0,0N 7,34mm
'Pxxx'	Set preforce (F0)	P0.4\$ *	F0=0.4N
'Qxxx'	Set constant force to keep (in CFM)	Q200\$	Force to keep = 200N
'R'	Begin test	R\$	Start button
'RESET'	Hard reset	RESET\$	Reset of system
'S'	Ask for Status	S\$	Condition of machine
'SER?'	Ask for serial number of machine	SER?\$	0001 (max 20char.)
'SER:'	Set serial number in machine	SER:0001\$	Set ser.# 0001 (max 20char.)
'T'	Read software ver. nr. in Flash mem.	T\$	" HEX-3.35 5. 2000 "
'U'	Ask for actual units (US or SI)	U\$	1-SI system, 0-Us system

'Vxxx'	Set speed testing speed	V100\$	V=100mm/min
'Xxxx'	Move to position	X20\$	20mm to up

Serial communication port :

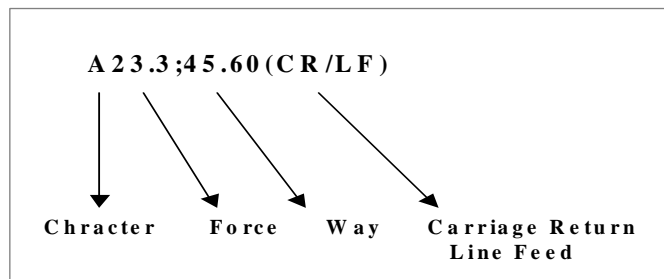
Pin 1=DCD
Pin2=Rx D
Pin3=Tx D
Pin4=DTR
Pin5=GND
Pin6=DSR
Pin7=RTS
Pin8=CTS
Pin9=RI

Data format : Baud rate 384 Parity
RTS/CTS Handshake

None Stop bittocol

Transferexample:

Character possibility:



- „A“ -actual readings
- „M“ -last readings of max. value(Fmax ; Xmax)
- „B“ -last readings of break(Fbreak ; Xbreak)
- „S“ -status of machine
- „E“ -machine return to zero position
- „R“ -test is running

„OK“ -reset of Load cell and position is done
EOF (ASCII=26)-end of data, end of test

Force = 23.3N
Way = 45.60mm

C 251 Compiler Communication procedure.

• • •

```
switch(combuffer[0])
{
    case 'R':versuch(0);
                break;
    case 'E':moveto(wegoffset,Tconfig.VR);
                printf("E\n\r");
                break;
    case 'H':mstop();
                break;
    case 'O':adnnullen();
```



```

        printf("OK\n\r");
        break;
case 'A':printf("A% 6.*F;% 6.2F\n\r",Tconfig.nachkomma,getkraft(),getweg());
        break;
case 'M':printf("M% 6.*F;% 6.2F\n\r",Tconfig.nachkomma,fmax,xmax);
        break;
case 'B':printf("B% 6.*F;% 6.2F\n\r",Tconfig.nachkomma,frupt,xrupt);
        break;
case '$':resetproc();
        break;
case 'V':combuffer[0]=' ';
        T=atof(combuffer);
        if ((T>1)&&(T<1000)) Tparablock.SPEED=T;
        break;
case 'L':combuffer[0]=' ';
        T=atof(combuffer);
        Tparablock.endpos=T;
        break;
case 'X':combuffer[0]=' ';
        T=atof(combuffer);
        moveto(T,Tconfig.VR);
        break;

case 'S':printf("S%d\n\r",status);

```

Delphi 3.0 Receive procedure (for exp.)

```

procedure TForm1.receive(s:string);
const status:word=0;
var  s1,s2:string;
      index1,index2:word;
      y:tvaluesx;
begin
  case s[1] of
    'A':  Begin
            index1:=pos(';',s);
            s1:=copy(s,2,index1-2);
            index2:=pos('#10,s);
            s2:=copy(s,index1+1,index2-index1-1);
            panel2.caption:=s2+'mm';
            panel3.caption:=s1+' N';
          end;
    'R':  Begin
            if status=0 then
              begin
                xychart1.clear;
                timer1.enabled:=false;
                inc(status);

```

```

        end;
        index1:=pos(';',s);
        s1:=copy(s,2,index1-2);
        index2:=pos('#10,s);
        s2:=copy(s,index1+1,index2-index1-1);
        panel2.caption:=s2+'mm';
        panel3.caption:=s1+' N';
        Y[0]:=strtofloat(s2);
        Y[1]:=strtofloat(s1);
        Y[2]:=0;
        Y[3]:=0;
        y[4]:=0;
        xychart1.add(y);
    end;
#26: begin
        status:=0;
        timer1.enabled:=true;
        speichern1.click(self);
    end;
end;
end;

```

Serial communication port:

Pin 1=DCD
 Pin2=RxD
 Pin3=TxD
 Pin4=DTR
 Pin5=GND
 Pin6=DSR
 Pin7=RTS
 Pin8=CTS
 Pin9=RI

Data format:

Bit per second	38400
Data bits	8
Parity	Keine
Stopbits	1
Protocol	Kein

examples :

Character possibility:

"A" -actual readings
 "M" -last readings of max. value(Fmax;Xmax)
 "B" -last readings of break(Fbreak;Xbreak)
 "S" -status of maschine
 "E" -maschin return to zero position
 "R" -test is runing
 "OK" -reset of Loadcell and position is done

EOF (ASCII=26)-end of data, end of test

Force = 23.3N

Way = 45.60mm

C 251 Compiler Communication procedure.

```

switch(combuffer[0])
{
  case 'R':versuch(0);
    break;
  case 'E':moveto(wegoffset,Tconfig.VR);
    printf("E\n\r");
    break;
  case 'H':mstop();
    break;
  case 'O':adnullen();
    printf("OK\n\r");
    break;
  case 'A':printf("A% 6.*F;% 6.2F\n\r",Tconfig.nachkomma,getkraft(),getweg());
    break;
  case 'M':printf("M% 6.*F;% 6.2F\n\r",Tconfig.nachkomma,fmax,xmax);
    break;
  case 'B':printf("B% 6.*F;% 6.2F\n\r",Tconfig.nachkomma,frupt,xrupt);
    break;
  case '$':resetproc();
    break;
  case 'V':combuffer[0]=' ';
    T=atof(combuffer);
    if ((T>1)&&(T<1000)) Tparablock.SPEED=T;
    break;
  case 'L':combuffer[0]=' ';
    T=atof(combuffer);
    Tparablock.endpos=T;
    break;
  case 'X':combuffer[0]=' ';
    T=atof(combuffer);
    moveto(T,Tconfig.VR);

```

```

        break;

case 'S':printf("S%d\n\r",status);
        break;
case 'F':combuffer[0]=' ';
        T=atof(combuffer);
        if (fabs(T)<CONFIG.GRENZLAST) Tparablock.LIMIT=fabs(T);

case 'D':combuffer[0]=' ';
        T=atof(combuffer);
        Tparablock.DELTA_F=fabs(T);
case 'P':combuffer[0]=' ';
        T=atof(combuffer);
        Tparablock.F0=fabs(T);

    }

```

Delphi 3.0 Receive procedure (for example)

```

procedure TForm1.receive(s:string);
const status:word=0;
var s1,s2:string;
    index1,index2:word;
    y:tvaluesx;
begin
case s[1] of
'A': Begin
    index1:=pos(';',s);
    s1:=copy(s,2,index1-2);
    index2:=pos('#10,s);
    s2:=copy(s,index1+1,index2-index1-1);
    panel2.caption:=s2+'mm';
    panel3.caption:=s1+' N';
    end;
'R': Begin
    if status=0 then begin
        xychart1.clear;
        timer1.enabled:=false;
        inc(status);
        end;
    index1:=pos(';',s);
    s1:=copy(s,2,index1-2);
    index2:=pos('#10,s);
    s2:=copy(s,index1+1,index2-index1-1);

```

```
    panel2.caption:=s2+'mm';
    panel3.caption:=s1+' N';
    Y[0]:=strtofloat(s2);
    Y[1]:=strtofloat(s1);
    Y[2]:=0;
    Y[3]:=0;
    y[4]:=0;
    xychart1.add(y);
    end;
#26:begin
    status:=0;
    timer1.enabled:=true;
    speichern1click(self);
    end;

end;
end;
```

Cable: 9 pole 1:1 DCE-DTE

CTS Protocol!

7) *special programs for test machine*

F(0) Mode

*if F(0) Mode is set to “ 1 “ x will automatically be set to 0
if load will come to a special value (after touching the sample)
used for compression tests*

constant force regulation

with key 8 you can switch to force regulation

with key Menue you can set force

*for example 5 N makes tension 5 N
for example -5N makes compression 5 N*

*if you press Start key force regulation will be activated
machine drives slowly to this force*

*if you press again on key 8 you come back to normal constant speed
regulation*

*in constant force regulation modus you can change settings
depending on hardness of material from 1 to 10*

Push button Menu of tensile tester

*if material is weak push 1 reaction speed is high
if material is hard push 10 reaction speed is low*

8) *number of machine*

*on backside of machine you can find this number
please use it if you have questions*

9) *Accessories*

*1 USB cable
1 110/220V cable
2 pins 8 mm for adapter
1 certification of load cell*

grips see also <http://www.grip.de>

Addendum

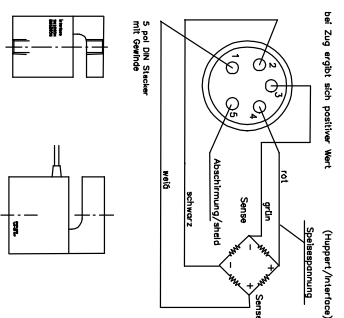


International Symbols

WEEE Directive

This equipment contains Electrical and Electronic circuits and should not be directly disposed of in a landfill site.

Optional !!!

[illegible]

Thümler GmbH
grip - engineering

Hans Traut Str. 25
Tel.: 09122-78711

90455 Nürnberg
Fax.: 09122-73127

Germany
info@grip.de

Declaration of Conformity

name and
location of producer:: *Thümler GmbH 90455 Nürnberg Hans Traut Str. 25*

name of machine *small tensile tester Z 3 Z5 Z10*

directives
compiled with

EG Maschinenrichtlinie 89/392
und EWG 91/368, EWG 93/44
VDE 0100, VDE 0106, VDE 0113, DIN 57113 / EN 60204
VDE 0160, VDE 0660
VBG1, VBG4, VBG5, VBG7A, ZH1/456 und ZH1/597
low voltage directive (73/23/EEC) ('LVD')
EMC directive (89/336/EEC) ('EMC')

responsible *M. Thümler Dipl. Ing. (Univ.) Maschinenbauing.*

function *Line, development, conception, construction*
registered into the following handicrafts registers
- Elektromechanikerhandwerk Lfd. Nr. 92/09/132 BNR 0052159
- Maschinenbauerhandwerk Lfd. Nr. 87/13/062 BNR 0052159

Nürnberg, den 15.3.2004



.....

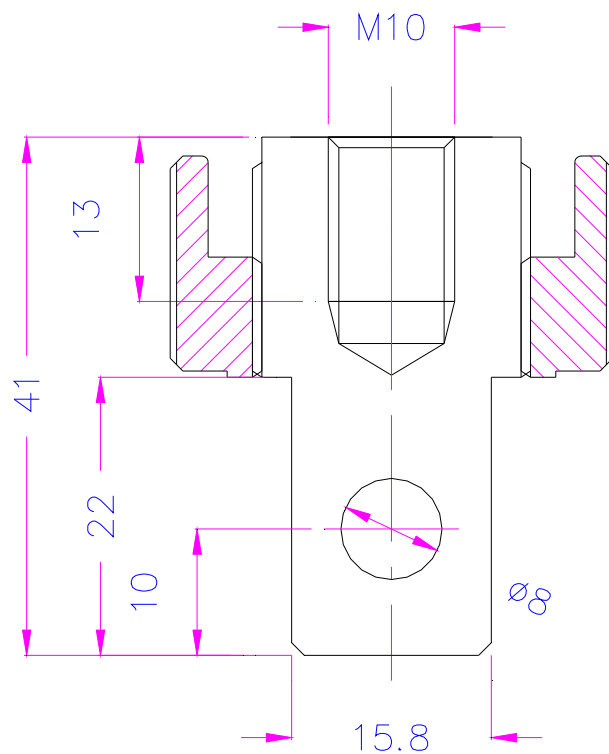
10) Windowssoftware

you can download actual software, manual and hexfile from our software homepage

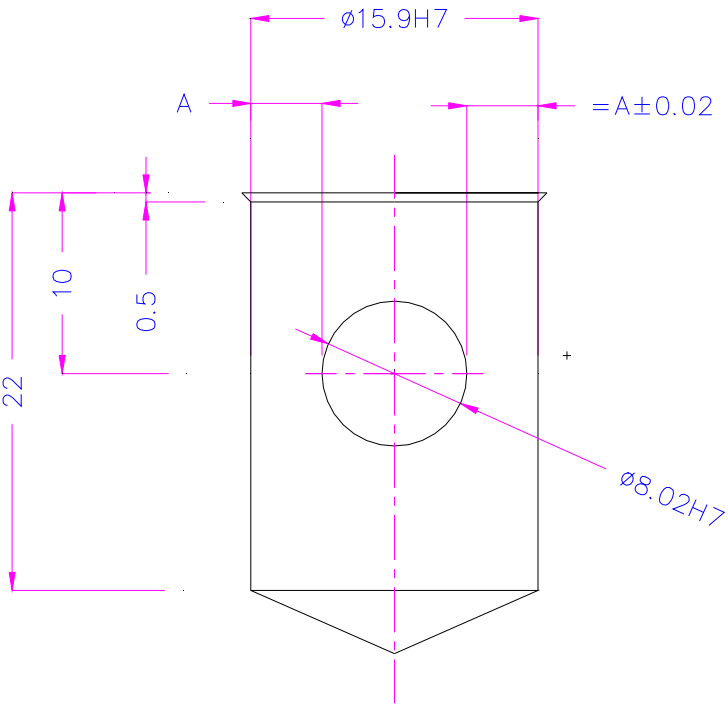
<http://www.grip-soft.de>

11) Rest

Adapter size of Z3 and Z10



THS438-15.8-M10



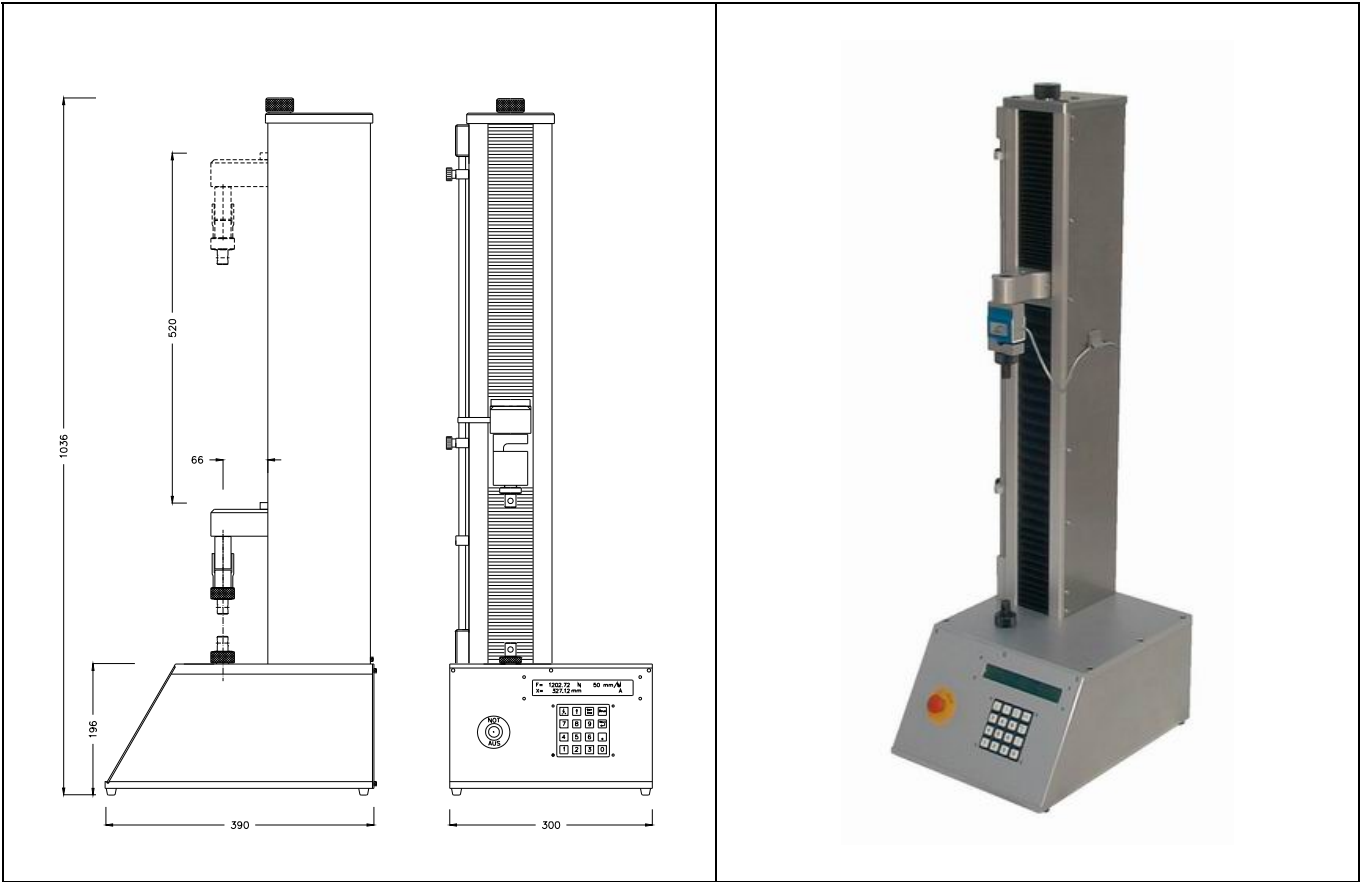
known mechanical problems



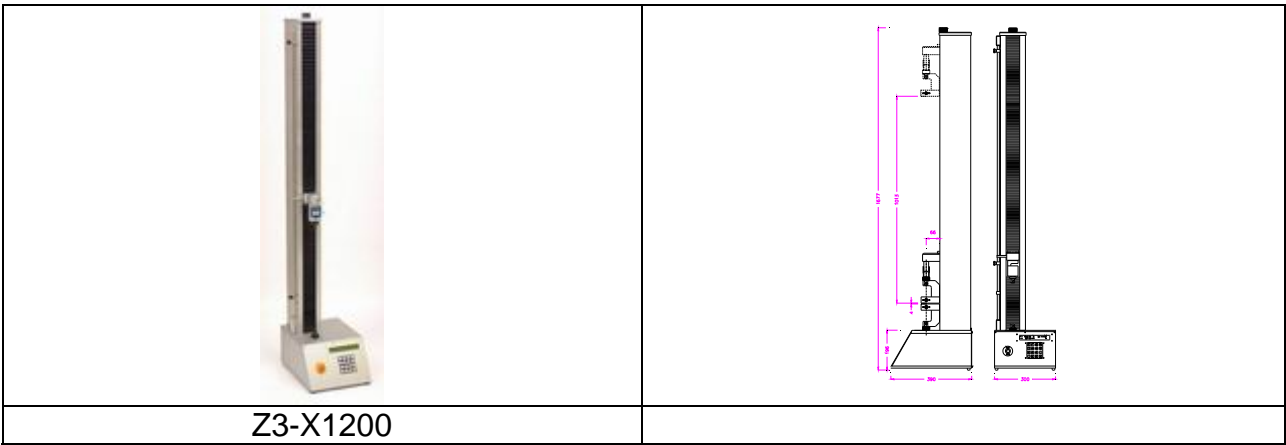
open screw in nut (top screw in machine)
Relase M6 screw in nut
close (turn nut clockwise) while machine is under load

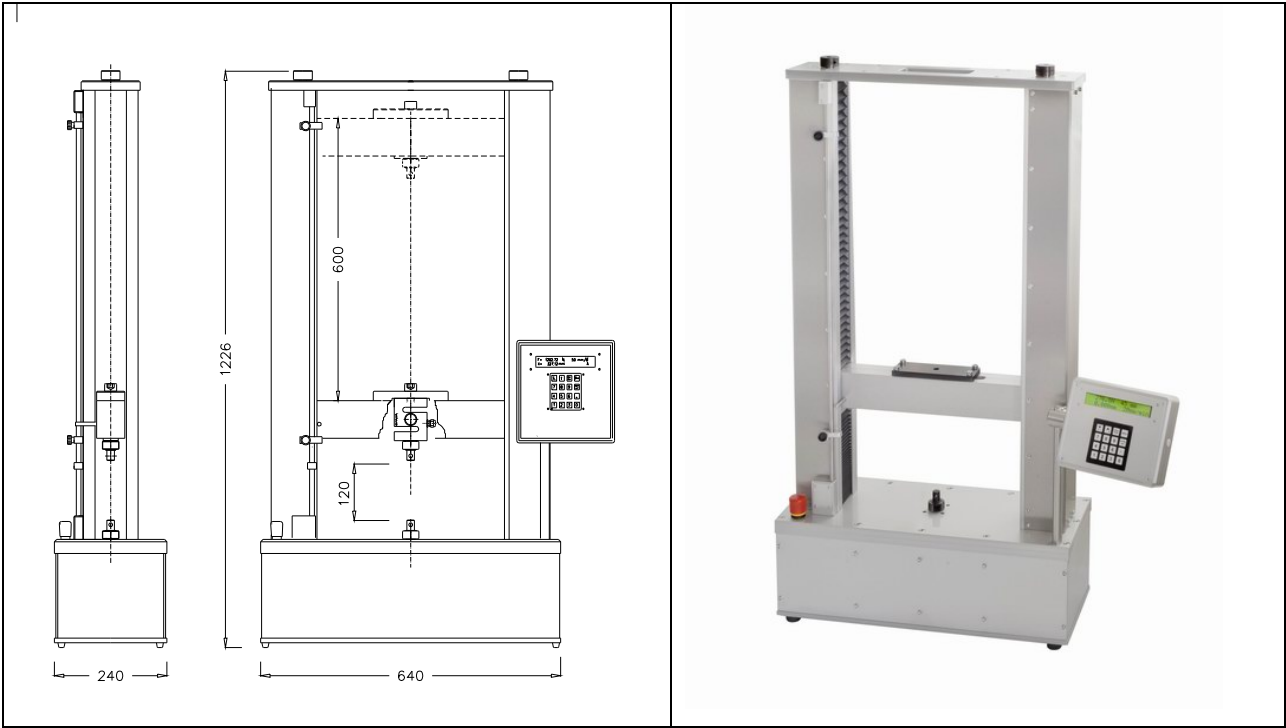


Or little wheel on engine is not probably glued -
we exchange engine (motor) - send it back
this is a case of warranty

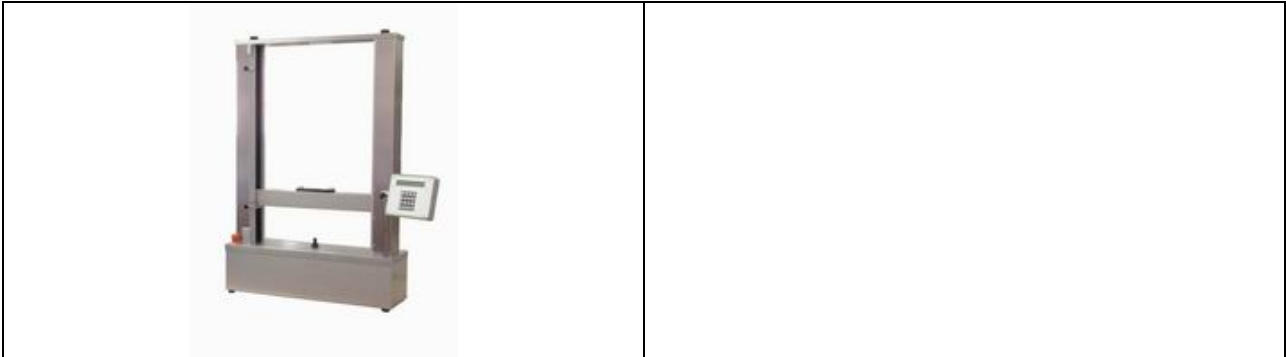


Z3-X500 3kN 500 mm



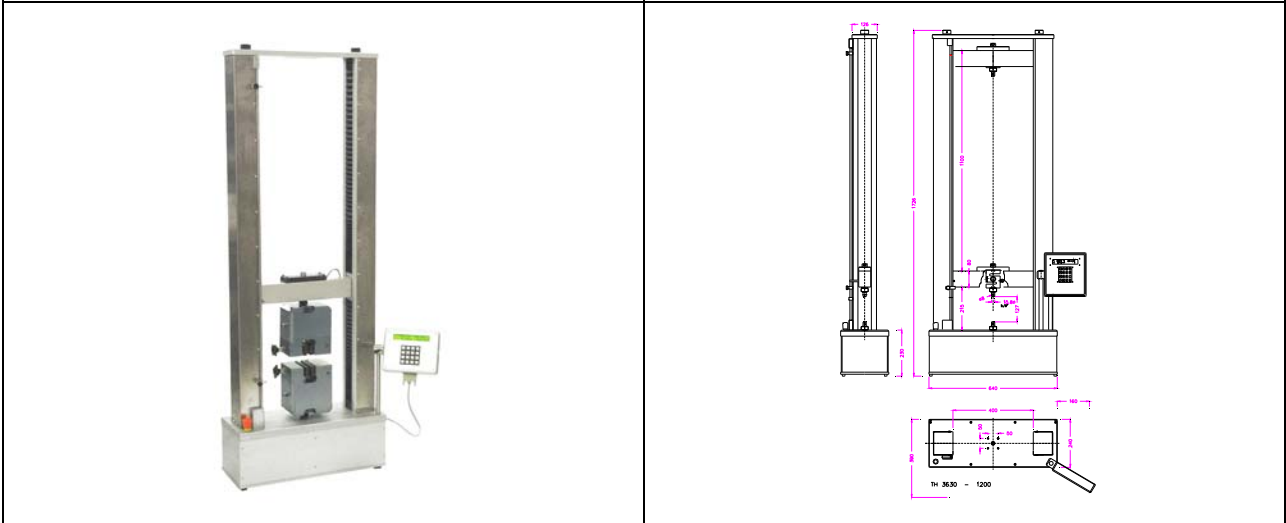


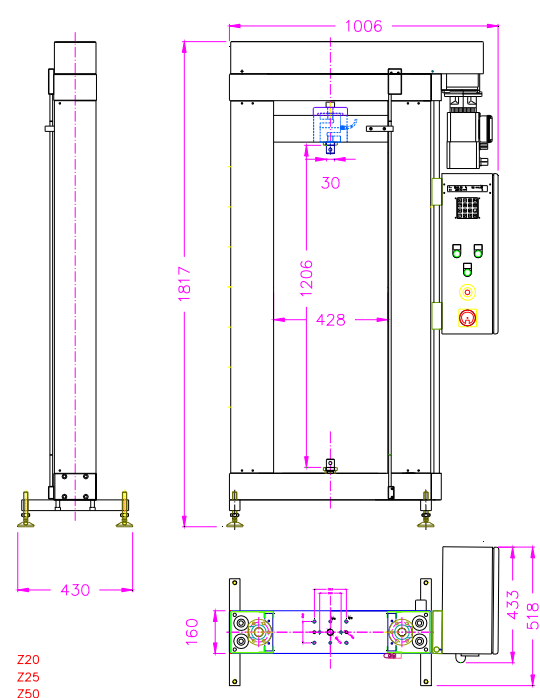

Z10-X700 10kN 700mm

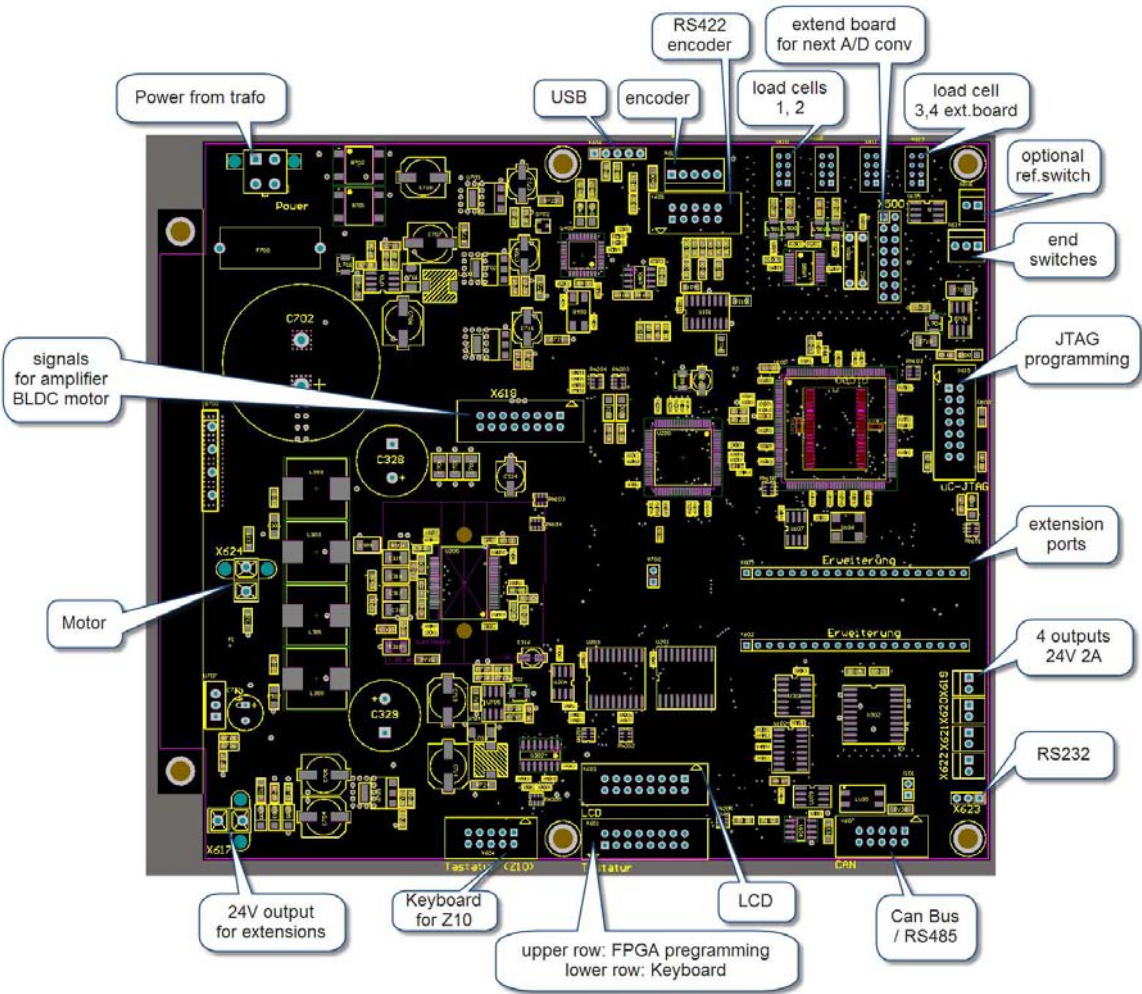


Z10-X700-W600 inner width 600mm

Z10-X1200



 <p>Technical drawing of the Robuste Universalprüfmaschine showing side and front views with dimensions. The side view shows a height of 1817 mm, a width of 1006 mm, and a base width of 430 mm. The front view shows a height of 518 mm, a width of 160 mm, and a base width of 433 mm. The drawing also indicates a 30 mm gap and a 1206 mm distance between the main vertical columns. The model numbers Z20, Z25, and Z50 are listed in red text.</p> <p>Z20 Z25 Z50</p>	 <p>Photograph of the Robuste Universalprüfmaschine, a large industrial testing machine with a vertical frame and a control panel on the right side.</p>
<p>Robuste Universalprüfmaschine Baureihe: Z20 – Z50</p>	



Mistakes:

Movement of Z10-X700 is only 500 mm

This is only limit of software (not limit of mechanic) you can't set end position more as 500mm. Z10 use universal software from Z3-Z5.

In configuration menu (protected by password) exist parameter: "machine type" with value=5, change this value to "6" and limit of max. end position will be now 1000mm.

Hints

you can activate a c compensation in settings

you make a measurement of a very stiff part in your grips
then you divide dF/dx and write this value to C compensation and activate
then you will only see movement of the sample not loadcell machine or grips

Autocalibration Limits of loadcell 24.4.08

In our software exist limits:

$1 < mV/V < 6$ (you can just use 1.001 mV/V value)

$0,5 < Cal < 1,5$

Any new load cell used with our machines must be calibrated (adapted to our electronic).
the best (most easy) way is to use auto calibration (embedded in software).

You will need some precision "check weight" elements (100g - 300g)
and some scale pan (dish) or something different to fix "check weight" on the load cell adapter.

Procedure:

1. install new load cell
2. in configuration menu (pass. 09122) set nominal load = 5 N
3. set $mV/V = 1.001$
4. set $Cal = 0$ (zero) -auto calibration will be activated
5. for question "mit Gewicht eichen?..." press key "1"
6. from now you have only 40 sec. for each answer (if time is over, you will need again repeat procedure from p.4)
7. now leave on load cell only scale pan (dish) with pin (this is "tara", we need measure only "check weight element") and press "Return" key
8. now auto calibration will set "tara"
9. for message: "Last aufrufen", install "check weight element" and press "Return" key
10. now auto calibration will calculate average weight
11. for message: "Last: 38.460" set weight in [N] of your "check weight element" (i.e. if you use 200g - set 1,961 N ($0,2 \cdot 9,80665 = 1,96133$ N))
12. now you get new calculated force (i.e. if you set 1,961N you will get about 1,96N)
13. if calculation was wrong and you need to repeat auto calibration press now key "9"
14. if calculation was OK, press key "1" to finish auto calibration set new calibration factor
15. now you will see new factor (i.e. 1,231)
16. this is end of auto calibration, you can go out of configuration menu.

" max. Last / Motor gestoppt" <- such message is generated in two cases:

1. load cell is damaged (overloaded - bended) and show very big (positive or negative) load over safety limit (~2900N)
2. A/D converter on main board don't work correctly (no valid conversions).

First case you can check:

- when you connect any different load cell - you can see normal load readings on the LCD
- when you remove any load cells plug from the machine - load display is "running up" or "down" until limit (open loop).

You can also send us old load cell to check or check it self on next machine (by next customer with our ZPM).

New load cells we have on stock.

A.Urbanski service service@grip-soft.de 18-09-2008